

# Innovative Technology Transfer Partnership (ITTP)

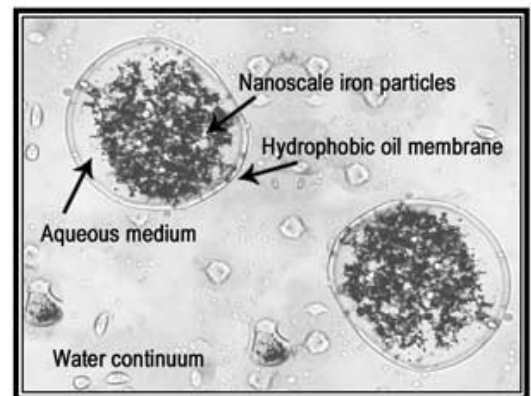


## *Success Story*

### **GeoSyntec Consultants Licenses NASA's Groundwater Remediation Technology**

#### **Description of Innovation**

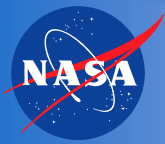
On August 24, 2004, the NASA Kennedy Space Center (KSC) Technology Transfer Office successfully completed the negotiation and signing of a Nonexclusive Patent License Agreement with GeoSyntec Consultant for the use and sale of NASA's Emulsified Zero Valent Iron (EZVI) (U.S. Patent No.6,664,298) technology for groundwater remediation. GeoSyntec, based in Boca Raton, Florida, is a small-business, environmental consulting and groundwater remediation services company with commercialized specialty products for groundwater remediation. "Development and deployment of this technology clearly demonstrates that NASA environmental programs have direct applicability to remediation programs worldwide," according to Dr. David Major, GeoSyntec's Principal-in-Charge for this demonstration program.



**Micrograph of an EZVI emulsion droplet.**

During the early history of the space program, areas of Launch Complex 34 at KSC were polluted with solvents used to clean Apollo rocket parts. The solvents were classified as DNAPLs. Left untreated in the ground, DNAPLs are able to contaminate fresh water sources. DNAPLs are a common cause of environmental contamination at thousands of DOE, DOD, NASA, and private industry facilities.

Thousands of locations across the United States have been identified that are contaminated with DNAPLs. However, few technologies exist that can treat DNAPLs in a timely and cost-effective manner. NASA's EZVI technology overcomes these limitations by providing a method that is quick, effective, and cost-competitive. EZVI involves placing nano-scale zero-valent iron particles into a surfactant-stabilized, biodegradable water-in-oil emulsion. This emulsion is injected into the DNAPL-contaminated zones of the subsurface. The DNAPL is then pulled into the emulsion where the contaminant reacts with the zero-valent iron. Through a process known as reductive dehalogenation, the DNAPL and its daughter products are degraded into ethane and other hydrocarbons. These by-products are finally broken down through biological activities in the subsurface.



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#### **Commercial Benefits**

Beginning in the 1950s and 1960s, an abundance of effort and initiative was focused on propelling the space industry outward for planetary exploration and habitation. During these early years, the push to take space science to new levels indirectly contributed to the evolution of another science field that would not fully surface until the early 1980s, environmental remediation. This field is associated with the remediation or cleanup of environmental resources such as groundwater, soil, and sediment.

Because the space-exploration initiative began prior to the establishment of the U.S. Environmental Protection Agency (EPA) in December of 1970, many NASA Centers as well as space-related support contractors allowed for the release of spent chemicals into the environment. Subsequently, these land owners have been directed by the EPA to responsibly initiate cleanup of their impacted sites. The EPA has reported that DNAPLs are present at 60% to 70% of all sites on the Superfund National Priorities List. Other contaminated sites may include: dye and paint manufacturers, dry cleaners, chemical manufacturers, metal cleaning and degreasing facilities, leather tanning facilities, pharmaceutical manufacturers, and adhesive and aerosol manufacturers.

#### **Partnership Contributions**

Additionally, GeoSyntec has also been awarded funding from the DOD Environmental Security Technology Certification Program to continue to evaluate the technology and conduct another field-scale demonstration of the technology. GeoSyntec intends to market this invention to clients across North America, Europe, and Australia.

#### **ITTP Role**

GeoSyntec has been working with NASA since 1999 under a NASA Small Business Technology Transfer (STTR) contract to evaluate this technology, improve its application, and demonstrate the technology at a field scale.

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